1857MNRAS..17..205W

at 2 A.M., and afterwards, it was confirmed. The light in the east at that season of the year rose at a greater angle to the horizon than the other, and was some 13° longer, which accounts for its being seen within a less distance of midnight.

2dly. On the great lateral changes of the light, hour by hour, and *even half-hour*.

These were not seen at great heights in the atmosphere, and might easily be superinduced to an observer at the level of the sea, by moving haze, or fatigued eye, extraneous lights, &c. &c.

3dly. On having seen a lunar zodiacal light. An appearance of this sort I also observed on the Peak of Teneriffe, but measures of its angle with the horizon and consideration of the time and circumstances of its appearance, showed that it was not a zodiacal light, but the representative, in the lunar dawn, of the high-rising pink blush which precedes the solar day in a clear sky; and it was also shown that the lunar zodiacal light, according to the geocentric hypothesis, must be so very much fainter than the cone of the lunar dawn, as to be perfectly invisible to the human eye.

The most remarkable, however, of all the statements of the Rev. G. Jones, and one whereon may well rest the whole question between the geocentric and heliocentric hypotheses, is that one which is contained towards the conclusion of his paper; and is no less than "that when his ship sailed to the south of the Equator, the zodiacal light accompanied them, going southwards amongst the stars, and *vice versâ*, in a northerly cruise."

In reference to this point, I have examined the numerical measures of the right ascension and declination of the light, made by me on the Hottentot's Holland Sniew Kop, at a height of 4500 feet, in South Africa, with the similar observations for the same season of the year on Mount Guajara, in Teneriffe, at a height of 8903 feet, both stations, therefore, unexceptional for clearness of atmosphere; and I find the places given in the sky identical, notwithstanding a difference of 62° in the latitudes of the two mountains. When to this I add, that in the spring, at the Cape, in latitude S. 34°, the zodiacal light was always seen tending up to those same *Pleiades*, to which it may be seen invariably stretching at the same season of the year in this country, though the latitude is N. 56°, I cannot but suspect that the observations of the Rev. G. Jones in the U. S. frigate Mississippi apply to something which is not zodiacal light at all.

An Account of an Experiment on the Sun's Actinic Power, made by J. J. Waterston, Esq.

"The following is an account of an experiment I made in Bombay, in November 1855, on the limit of photographic power

Downloaded from http://mnras.oxfordjournals.org/ at University of Otago Science Library on July 17, 2015

© Royal Astronomical Society • Provided by the NASA Astrophysics Data System

1857MNRAS..17..205W

of the Sun's direct light. It was made with the view of obtaining data in an inquiry as to the possibility of measuring the diameter of the Sun to a very minute fraction of a second by combining photography with the principle of the electric telegraph: the first being employed to measure the element space, the latter the element time. The result is, that about one twenty-thousandth of a second is sufficient exposure to the direct light of the Sun to obtain a distinct mark on a sensitive collodion plate, when developed by the usual processes.

" A circular wooden disk 19 inches diameter, and half-an-inch thick, was mounted on an iron axis, so that it revolved easily by an impulse given by pressing the finger with a jerk on the outer edge.

" About half-an-inch from the rim there was a circular aperture half-an-inch diameter, at the back of which the black paper was pasted. This paper was perforated by a needle, leaving a hole $\frac{1}{60}$-inch diameter. It was found that the utmost velocity that could be given to the disk was five revolutions in a second; and after four seconds, it was reduced to three revolutions per second. At each revolution the space described by the hole was about 50 inches.

" The revolving disk was placed behind the folding-doors of a darkened chamber, so that when one wing was opened to the extent of a few inches, the Sun's light struck the disk at the lower part of its revolution. Having made the preliminary arrangements, the observation was as follows:—

" First, the maximum rotatory motion was given to the disk. A prepared sensitive plate was held close behind the disk (about $\frac{1}{4}$-inch from it), at the part where the sunshine struck. This plate was kept slowly moving in the direction of the radius of the disk. An assistant quickly opened and shut the door, allowing the sunshine to act for about a second. The latent image on the plate being developed, was found to consist of four or five concentric lines. This was repeated several times with different plates.

" Taking the velocity of the aperture to be 150 inches per second, which is certainly under the mark, and the breadth of the hole $\frac{1}{60}$th of an inch, the duration of the Sun's full action on any one point must have been about $\frac{1}{9000}$th of a second.

" The photographic process employed was as follows:—

" ' Albumen on glass iodized by tincture of iodine, 20 gr. to 1 oz. of spirit.

" ' The silver bath, 50 gr. nitrate of silver to 1 oz. water, and 12 drops nitric acid.

" ' The developing solution 3 parts water to one of acetic acid, and the mixture nearly saturated with protosulphate of iron.'

" The above was afterwards tried comparatively with the collodion process, and found to be considerably inferior in quickness of taking an impression, the ratio being 2 or 3 to 1."

Downloaded from http://mnras.oxfordjournals.org/ at University of Otago Science Library on July 17, 2015

© Royal Astronomical Society • Provided by the NASA Astrophysics Data System